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DOCUMENT SERVICES MANAGEMENT INCLUDING AVAILABILITY REPORTING OF DOCUMENT DISTRIBUTION SERVICES

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Cross-Reference to Related Applications

This application is related to Non-Provisional U.S. Patent Application Serial No. 09/782,765, entitled "DOCUMENT DISTRIBUTION SYSTEM AND METHOD WITH CONSOLIDATED DOCUMENT SERVICES MANAGEMENT", filed on February 13, 2001, assigned to the assignee of the present invention, and incorporated herein by reference.

The Field of the Invention

The present invention relates generally to document services and, more particularly, to a system and method of managing document distribution services of a plurality of document distribution providers, including reporting an availability of such services.

Background of the Invention

Typically, a user of a personal computer has multiple services or options available to them for distributing a document from the computer. The user, for example, may print the document at a printer, send the document electronically via e-mail, or publish the document with print publishing services. To be able to utilize such services, however, the user must be aware of such services and, more importantly, a program or driver for each of the services must be installed on the computer.

Unfortunately, managing such services on a plurality of individual computers is a laborious task. Each service, for example, must be deployed, installed, configured, and maintained on each computer. Understandably, management of such services is augmented by the number of distribution services being provided as well as the number of users or computers needing

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access to such services. Typically, an administrator is responsible for maintaining an availability of the services for use by the users. The administrator, however, only receives information on which services have failed not necessarily which services are working or available and, more specifically,

5   how long and/or how well the services have been working or available.

Accordingly, a need exists for managing document distribution services of a plurality of document distribution providers and, more particularly, monitoring and reporting an availability of such services.

10   **Summary of the Invention**

One aspect of the present invention provides a method of managing document distribution services. The method includes registering the document distribution services, identifying at least one resource for each of the document distribution services, and monitoring an availability of the at least one resource

15   for each of the document distribution services. As such, identifying at least one resource for each of the document distribution services includes defining at least one attribute of the at least one resource and monitoring the availability of the at least one resource for each of the document distribution services includes recording a status of the at least one attribute of the at least one resource.

20   Another aspect of the present invention provides a system for managing document distribution services. The system includes a document distribution system controller configured to have the document distribution services registered therewith, and an availability analysis system associated with the document distribution system controller and adapted to monitor an availability of

25   the document distribution services. As such, the availability analysis system is adapted to record a status of at least one attribute of at least one resource for each of the document distribution services.

In one embodiment, the present invention provides a system and method of managing document distribution services of a plurality of document

30   distribution providers, including reporting an availability of such services. As such, the system and method utilizes a communication network linking the

document distribution providers and a controller of the system to efficiently monitor the document distribution services and report an availability of the services to a system administrator.

5 **Brief Description of the Drawings**

Figure 1 is a block diagram illustrating one exemplary embodiment of a document distribution system according to the present invention.

Figure 2 is a block diagram illustrating one exemplary embodiment of information flow through a portion of the document distribution system of
10 Figure 1.

Figure 3 is a block diagram illustrating one exemplary embodiment of information flow through another portion of the document distribution system of Figure 1.

Figure 4 is a diagram illustrating one exemplary embodiment of a user
15 interface of the document distribution system of Figure 1.

Figure 5 is a block diagram illustrating one exemplary embodiment of information flow through the document distribution system of Figure 1.

Figure 6 is a flow diagram illustrating one exemplary embodiment of a method of distributing a document according to the present invention.

20 Figure 7 is a block diagram illustrating one exemplary embodiment of document services management of the document distribution system of Figure 1.

Figure 8 is a block diagram illustrating another exemplary embodiment of document services management of the document distribution system of Figure 1.

25 Figure 9 is a diagram illustrating one exemplary embodiment of printer events monitored according to the present invention.

Figure 10 is a diagram illustrating one exemplary embodiment of electronic mail application events monitored according to the present invention.

Figure 11 is a diagram illustrating one exemplary embodiment of print
30 service provider events monitored according to the present invention.

Figure 12 is a block diagram illustrating one exemplary embodiment of an availability analysis system of the document distribution system of Figure 8.

Figure 13 is a flow diagram illustrating one exemplary embodiment of a method of managing document distribution services according to the present

5   invention.

Figure 14 is a flow diagram illustrating one exemplary embodiment of a method of reporting availability of document distribution services in the method of Figure 13.

10   **Description of the Preferred Embodiments**

In the following detailed description of the preferred embodiments, reference is made to the accompanying drawings which form a part hereof, and in which is shown by way of illustration specific embodiments in which the invention may be practiced. It is to be understood that other embodiments may

15   be utilized and structural or logical changes may be made without departing from the scope of the present invention. The following detailed description, therefore, is not to be taken in a limiting sense, and the scope of the present invention is defined by the appended claims.

A document distribution system according to the present invention is

20   illustrated generally at 10 in Figure 1. Document distribution system 10 facilitates distribution of a document 12 of a user 14 to a document distribution provider 16 offering a document distribution service 18. In particular, document distribution system 10 manages distribution of a document 12a, 12b of a respective user 14a, 14b to at least one document distribution provider 16a, 16b,

25   16c offering a document distribution service 18a, 18b, 18c, respectively. For clarity, document 12a, 12b, user 14a, 14b, document distribution provider 16a, 16b, 16c, and document distribution service 18a, 18b, 18c are referred to hereinafter as document 12, user 14, document distribution provider 16, and document distribution service 18, respectively.

30   User 14 may be one of a plurality of users 20 each having a respective document 12. Document distribution provider 16 may be one of a plurality of

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document distribution providers 22 collectively providing document distribution services 24. As such, document distribution system 10 manages document distribution services 24 of document distribution providers 22 and routes documents 12 of users 20 to document distribution providers 22 for distribution

5 via document distribution services 24, as described below.

Document 12, as used herein, is defined to include any information presented in textural and/or graphical form. User 14, as used herein, is defined to include an entity or entities such as a consumer, an employee, or a system requesting, soliciting, and/or using distribution services for a document.

10 Document distribution provider 16, as used herein, is defined to include an entity, device, or system offering and/or providing distribution services for a document. Document distribution service 18, as used herein, is defined to include any distribution, delivery, display, and/or dissemination services for a document such as print services, electronic mail services, and/or publishing

15 services.

Document distribution providers 22 include hardware, software, firmware, or a combination of these. In one preferred embodiment, document distribution providers 22 include a computer server or other microprocessor based system capable of performing a sequence of logic operations. In addition,

20 document distribution providers 22 can include a microprocessor embedded system/appliance incorporating tailored appliance hardware and/or dedicated single purpose hardware.

Document distribution system 10 includes a document distribution system controller 26 which manages and/or coordinates distribution of

25 documents 12 to document distribution providers 22. More specifically, document distribution system controller 26 registers document distribution services 24 of document distribution providers 22, presents document distribution services 24 to users 20, and distributes documents 12 of users 20 to document distribution providers 22 offering document distribution services 24

30 selected by users 20, as described below. As such, document distribution system controller 26 facilitates management of document distribution services 24.

Document distribution system controller 26 includes hardware, software, firmware, or a combination of these. In one preferred embodiment, document distribution system controller 26 includes a host processor 27. Host processor 27 can be or can be included in a computer server or other microprocessor based

5   system capable of performing a sequence of logic operations. In addition, document distribution system controller 26 can include a microprocessor embedded system/appliance incorporating tailored appliance hardware and/or dedicated single purpose hardware.

In one exemplary embodiment, document distribution system controller

10   26 includes a memory device 28 which stores information for document distribution system controller 26 and/or document distribution system 10. Examples of memory device 28 include non-volatile memory (e.g., a hard disk drive or other persistent storage device) and may include volatile memory (e.g., random access memory (RAM)). Another example of memory device 28 may

15   include a relational database management server (RDBMS). While memory device 28 is presented as part of document distribution system controller 26, it is within the scope of the present invention for memory device 28 to be separate from document distribution system controller 26.

Users 20, document distribution providers 22, and document distribution

20   system controller 26 communicate with each other via a communication network 30. More specifically, communications between users 20, and document distribution system controller 26, communications between document distribution providers 22 and document distribution system controller 26, and communications between users 20 and document distribution providers 22 are

25   conducted over communication network 30. Communication network 30, as used herein, is defined to include a local-area network (LAN) and/or a wide-area network (WAN). Communication network 30, therefore, may include an intranet communication network, an Internet communication network, or similar high-speed communication network including a wireless communication

30   network.

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In one exemplary embodiment, users 20, document distribution providers 22, and document distribution system controller 26 are located remote from each other (i.e., at different location). Thus, communications between users 20, document distribution providers 22, and document distribution system controller

5   26 are conducted over communication network 30. It is, however, within the scope of the present invention for users 20, document distribution providers 22, and/or document distribution system controller 26 to be located at the same location. Thus, users 20, document distribution providers 22, and/or document distribution system controller 26 may communicate in other manners (e.g., a

10   direct connection or communication link).

Components of document distribution system 10, including document distribution providers 22 and/or document distribution system controller 26, can be implemented in hardware via a microprocessor, programmable logic device, or state machine, in firmware, or in software within a given device. In one

15   embodiment, at least a portion of the software programming is written in JAVA programming language, and each of the main components communicate via communication network 30 using a communication bus protocol. For example, the present invention may or may not use a TCP/IP protocol suite for data transport. Other programming languages, including scripting languages, and

20   communication bus protocols suitable for use with document distribution system 10 will become apparent to those skilled in the art after reading the present application.

As illustrated in Figure 2, document distribution providers 22 register document distribution services 24 with document distribution system controller

25   26 via communication network 30. More specifically, each document distribution provider 16a, 16b, 16c registers a respective document distribution option 32a, 32b, 32c representing a respective document distribution service 18a, 18b, 18c with document distribution system controller 26. For clarity, document distribution options 32a, 32b, 32c are referred to hereinafter as document

30   distribution options 32.

In one illustrative embodiment, document distribution providers 22 include a printer 221, an electronic mail application 222, and a print service provider 223. As such, document distribution services 24 include print services 241, e-mail services 242, and publishing services 243, respectively. Printer 221,

5   as used herein, is defined to include a printing device capable of producing printed output, including textural and/or graphical images, on a print medium, such as paper, in response to electronic signals. Examples of such a printing device include a laser printer, an inkjet printer, etc. Electronic mail application 222, as used herein, is defined to include a system for transmitting messages

10   electronically. Print service provider 223, as used herein, is defined to include an entity, device, or system offering, providing, and/or assisting in printing services, finishing services, delivery services, including physical delivery as well as electronic delivery, and/or other print processing services.

As illustrated in Figure 3, user 14 interacts with a computer 34 to initiate

15   distribution of document 12. In one exemplary embodiment, user 14 enters document distribution system 10 (Figure 1) and, therefore, initiates distribution of document 12 by selecting "FILE/PRINT..." in a program or application running on computer 34 and by selecting document distribution system 10, or an application incorporating document distribution system 10, as the "NAME" of

20   the printer. Thus, document distribution system 10 is launched by software installed on computer 34.

In one exemplary embodiment, computer 34 runs an operating system which can support one or more applications. The operating system is stored in memory and executes on a processor. The operating system is preferably a

25   multi-tasking operating system which allows simultaneous execution of multiple applications, although aspects of the present invention may be implemented using a single-tasking operating system. Computer 34 may include, for example, an input device such as a keyboard and/or a mouse and a display device such as a monitor, as is well known in the art. Computer 34 may be an appliance such as

30   a personal digital assistant (PDA), scanner, camera, cellular phone, etc.

When user 14 enters document distribution system 10, a distribution request 36 is submitted to document distribution system controller 26 via communication network 30. In addition, a data file 38 for document 12, as an electronic representation of document 12, is uploaded to document distribution

5   system controller 26 via communication network 30. In one exemplary embodiment, document distribution system controller 26 communicates with and transfers data file 38 for document 12 to memory device 28 (Figure 1). As such, memory device 28 stores data file 38 for document 12 for subsequent retrieval and processing, as described below.

10   In one exemplary embodiment, data file 38 for document 12 is converted into a standard or predetermined file format. The standard or predetermined file format is defined so as to be compatible with document distribution services 24 of document distribution providers 22. Thus, user 14 can consider all document distribution services 24 for document 12. An example of a standard or

15   predetermined file format includes a PDF (Portable Document Format) file format.

Preferably, data file 38 is converted into a standard or predetermined file format by computer 34 before uploading to document distribution system controller 26. It is, however, within the scope of the present invention for data

20   file 38 to be converted into a standard or predetermined file format by document distribution system controller 26 after uploading.

When distribution request 36 is submitted to document distribution system controller 26, document distribution system controller 26 compiles a list 40 of distribution options 32 for document 12. List 40 of distribution options 32

25   is based on document distribution services 24 as registered with document distribution system controller 26. As such, list 40 of distribution options 32 is presented to user 14 via communication network 30 and computer 34.

In one exemplary embodiment, as illustrated in Figure 4, distribution options 32 are presented to user 14 via a user interface 42 displayed on computer

30   34. User interface 42 includes a plurality of input fields 44 which represent distribution options 32. As such, user 14 selects distribution options 32 for

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document 12 by interacting with input fields 44. Input fields 44 include, for example, a "Print Document" field 46, a "Send Document" field 48, and a "Publish Document" field 50.

Print Document field 46 represents distribution of document 12 by

5   printing. Selection of Print Document field 46, therefore, indicates printing of document 12 with, for example, print services 241 of printer 221 (Figure 2). In one exemplary embodiment, Print Document field 46 includes subfields 461 which represent different printers for printing of document 12.

Send Document field 48 represents distribution of document 12 via

10   electronic mail. Selection of Send Document field 48, therefore, indicates sending of document 12 via, for example, e-mail services 242 of electronic mail application 222 (Figure 2). In one exemplary embodiment, Send Document field 48 includes subfields 481 which represent different e-mail addresses to which document 12 can be distributed or sent.

15   Publish Document field 50 represents distribution of document 12 by publishing. Selection of Publish Document field 50, therefore, indicates publishing of document 12 via, for example, publishing services 243 of print service provider 223 (Figure 2).

In one exemplary embodiment, input fields 44 include a "Preview

20   Document" field 52. Preview Document field 52 represents distribution of document 12 by displaying of document 12 on, for example, a display device of computer 34. Thus, distribution options 32 for document 12 include, for example, previewing of document 12, printing of document 12, sending of document 12, and/or publishing of document 12. It is understood that one or

25   more distribution options 32 may be selected and/or specified for document 12.

It is to be understood that Figure 4 is a simplified illustration of one exemplary embodiment of user interface 42. The illustrative presentation of input fields 44 including the respective subfields, for example, has been simplified for clarity of the invention. Input fields 44, including the respective

30   subfields, may be presented, for example, as open fields, pull-down menus,

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toggle selections, and/or highlighted or framed selections. In addition, user interface 42 may be presented, for example, in one or more screens or views.

As illustrated in Figure 5, user 14 submits a distribution selection 54 for document 12 to document distribution system controller 26 via communication

5 network 30. Distribution selection 54 represents a selection of distribution options 32 from user interface 42. As such, distribution selection 54 identifies one or more distribution options 32 for document 12. Thus, document distribution system controller 26 routes or distributes data file 38 for document 12 to one or more document distribution providers 22. Document distribution

10 system controller 26 routes data file 38 to document distribution providers 22 offering document distribution services 24 which fulfill distribution options 32 selected by user 14. In one exemplary embodiment, data file 38 is routed to document distribution providers 22 via communication network 30.

In one exemplary embodiment, user 14 also submits a distribution

15 instruction 56 to document distribution system controller 26 via communication network 30. Distribution instruction 56 includes one or more instructions for distribution of document 12 by document distribution providers 22. Thus, distribution instruction 56 includes one or more instructions relevant to document distribution services 24 which fulfill distribution options 32 selected

20 by user 14.

For example, if user 14 selects printing of document 12, distribution instruction 56 may include properties and/or options for print services 241 of printer 221 such as number of copies, print medium size/type, printing quality/resolution, printing layout/orientation, color printing, etc. For example,

25 if user 14 selects sending of document 12, distribution instruction 56 may include properties and/or options for e-mail services 242 of electronic mail application 222 such as classification, priority, reply request, delivery date, return notification, password protection, etc. For example, if user 14 selects publishing of document 12, distribution instruction 56 may include properties

30 and/or options for publishing services 243 of print service provider 223 such as

number of copies, print medium size/type/color, printing quality/resolution, printing layout/orientation, color printing, finishing/binding, etc.

After receiving data file 38, document distribution providers 22 distribute document 12 accordingly. For example, if user 14 selects printing of document

5   12, document distribution system controller 26 routes data file 38 to printer 221 which prints document 12 with print services 241. For example, if user 14 selects sending of document 12, document distribution system controller 26 routes data file 38 to electronic mail application 222 which sends document 12 with e-mail services 242. In addition, if user 14 submits distribution instruction

10   56, document distribution providers 22 distribute document 12 in accordance with distribution instruction 56, as described above.

In Figure 6, a flow diagram illustrating one exemplary embodiment of a method of distributing document 12 according to the present invention is illustrated generally at 100. Reference is also made to Figures 1-5. At step 110,

15   document distribution services 24 of respective document distribution providers 22 are registered with document distribution system controller 26. More specifically, distribution options 32 of document distribution services 24 are registered with document distribution system controller 26 via communication network 30, as illustrated in Figure 2. In one illustrative embodiment, step 110

20   includes registration of print services 241, e-mail services 242, and publishing services 243 of printer 221, electronic mail application 222, and print service provider 223, respectively.

At step 112, user 14 submits distribution request 36 and data file 38 for document 12 to document distribution system controller 26. In one exemplary

25   embodiment, user 14 submits distribution request 36 and uploads data file 38 to document distribution system controller 26 via communication network 30, as illustrated in Figure 3.

Preferably, document distribution services 24 of document distribution providers 22 are registered at step 110 before user 14 submits distribution

30   request 36 and/or data file 38 at step 112. It is, however, within the scope of the present invention for document distribution services 24 to be re-registered and/or

updated if, for example, document distribution services 24 are added, deleted, and/or modified. As such, document distribution services 24 can be managed or maintained at document distribution system controller 26.

Next, in step 114, after document distribution system controller 26

5   receives distribution request 36, document distribution system controller 26 determines which distribution options 32 are available for document 12. Distribution options 32 are based on document distribution services 24 registered with document distribution system controller 26 in step 110. As such, document distribution system controller 26 compiles list 40 of distribution options 32 for

10 user 14.

Next, in step 116, distribution options 32, as determined in step 114 and compiled in list 40, are presented to user 14. In one exemplary embodiment, distribution options 32 are presented to user 14 via communication network 30 and computer 34, as illustrated in Figure 3. As such, distribution options 32 are

15 represented on user interface 42, as illustrated in Figure 4.

Next, in step 118, user 14 selects one or more distribution options 32 for document 12. In one exemplary embodiment, distribution options 32 are selected by interacting with user interface 42. Thus, distribution selection 54 is conveyed to document distribution system controller 26, as illustrated in Figure

20 5. In addition, selecting distribution options 32 in step 118 may also include submitting distribution instruction 56 for document 12, as described above.

Next, in step 120, document distribution system controller 26 routes or distributes data file 38 and, if submitted, distribution instruction 56 for document 12 to one or more document distribution providers 22. Document distribution

25 system controller 26 routes data file 38 and distribution instruction 56 to document distribution providers 22 offering document distribution services 24 which fulfill distribution options 32 selected by user 14 in step 118. Thereafter, in step 122, document distribution providers 22 distribute document 12 in accordance with distribution options 32 selected by user 14 in step 118 and

30 distribution instruction 56 submitted by user 14.

In one exemplary embodiment, data file 38 and distribution instruction 56 are routed to document distribution providers 22 via communication network 30, as illustrated in Figure 5. In addition, when data file 38 for document 12 is uploaded to document distribution system controller 26 in step 112, document

5   distribution system controller 26 stores data file 38 in memory device 28, as described above. Thus, document distribution system controller 26 retrieves data file 38 from memory device 28 to distribute data file 38 in step 120.

Document Services Management

10   In one exemplary embodiment, as illustrated in Figure 7, document distribution system 10 includes a system administrator 58 which manages document distribution system 10. More specifically, system administrator 58 manages document distribution services 24 of document distribution providers 22 registered with document distribution system controller 26. Thus, system

15   administrator 58 interacts with document distribution system controller 26 and/or document distribution providers 22 to deploy, install, configure, and/or maintain document distribution services 24.

To manage document distribution services 24, system administrator 58 submits a management instruction 60 to document distribution system controller

20   26. Management instruction 60 includes one or more instructions for management of document distribution services 24. Thus, management instruction 60 includes, for example, deployment, installation, configuration, and/or maintenance information, commands, inquires, etc. Preferably, system administrator 58 interacts with and submits management instruction 60 to

25   document distribution system controller 26 via communication network 30. It is, however, within the scope of the present invention for system administrator 58 to directly interact with document distribution system controller 26 as represented by dashed line 62.

In one exemplary embodiment, document distribution system

30   administrator 58 includes hardware, software, firmware, or a combination of these. As such, document distribution system administrator 58 can include a

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computer server or other microprocessor based system capable of performing a sequence of logic operations, including management of document distribution services 24.

5   With document distribution services 24 of document distribution providers 22 registered with document distribution system controller 26, document distribution system 10 facilitates management of document distribution services 24. More specifically, since document distribution services 24 are registered with document distribution system controller 26, document distribution services 24 can be centrally-managed at document distribution

10   system controller 26. As such, it is not necessary to install and maintain document distribution services 24 of document distribution providers 22 at computer 34 for user 14. Thus, management of document distribution services 24, including, for example, deployment, installation, configuration, and/or maintenance, is consolidated.

15   Since document distribution services 24 are registered with document distribution system controller 26, document distribution services 24 can be managed and made available to user 14 without affecting a configuration of computer 34. For example, new document distribution services 24 can be registered with document distribution system controller 26 and, therefore, added

20   to document distribution system 10 without having to deploy and install document distribution services 24 on computer 34. Thus, new document distribution services 24 can be made available to user 14 without changing the configuration of computer 34.

    In one exemplary embodiment, as illustrated in Figure 8, document

25   distribution system 10 includes an availability analysis system 60 which facilitates management of document distribution services 24. More specifically, availability analysis system 60 analyzes an availability of document distribution services 24 and reports the availability of such services, as described in detail below. Availability analysis system 60 communicates with document

30   distribution system controller 26 and includes hardware, software, firmware, or a combination of these. As such, availability analysis system 60 can include a

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computer server or other microprocessor-based system capable of performing a sequence of logic operations, including management of document distribution services 24. While availability analysis system 60 is illustrated as being separate from document distribution system controller 26, it is within the scope of the

5 present invention for availability analysis system 60 to be a part of document distribution system controller 26.

Document distribution providers 22 constitute document distribution resources 23 which provide document distribution services 24. For example, printer 221 constitutes a document distribution resource 231 which provides

10 print services 241, electronic mail application 222 constitutes a document distribution resource 232 which provides e-mail services 242, and print service provider 223 constitutes a document distribution resource 233 which provides publishing services 243. It is understood that document distribution system 10 may include more than one printer 221, more than one electronic mail

15 application 222, and/or more than one print service provider 223 which constitute respective document distribution resources 23.

To facilitate an analysis of the availability of document distribution resources 23, one or more attributes 62 of respective document distribution resources 23 are defined and an attributes status 63 of attributes 62 is monitored.

20 Attributes status 63 of attributes 62 may be monitored, for example, at predetermined intervals of time.

Attributes 62 and attributes status 63 of attributes 62 define resource events of document distribution resources 23 which are monitored and analyzed by availability analysis system 60. Preferably, attributes 62 specify

25 characteristics or features of respective document distribution resources 23 which control and/or affect an availability of document distribution resources 23, including an ability of document distribution resources 23 to provide respective document distribution services 24. As such, attributes status 63 identify a status of respective attributes 62 and are indicative of an availability of document

30 distribution resources 23 and, therefore, document distribution services 24.

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As illustrated in Figure 8, attributes 62 and attributes status 63 of document distribution resources 23 are recorded or registered with document distribution system controller 26. In one exemplary embodiment, attributes 62 and attributes status 63 of respective document distribution resources 23 are

5 registered with and/or submitted to document distribution system controller 26 via communication network 30. Since availability analysis system 60 communicates with or is a part of document distribution system controller 26, availability analysis system 60 receives registration of document distribution services 24 as well as attributes 62 and attributes status 63 of document

10 distribution resources 23.

Figures 9-11 illustrate attributes 62 and attributes status 63 for printer 221, electronic mail application 222, and print service provider 223. Attributes 62 include, for example, electrical, mechanical, and/or consumables attributes of printer 221, electronic mail application 222, and print service provider 223. As

15 illustrated in Figure 9, printer 221, as document distribution system resource 231, includes attributes 621 which are monitored by respective attributes status 631. Attributes 621 of printer 221 and respective attributes status 631 of attributes 621 include, for example, a print medium quantity attribute having a status which is indicated as being "Full", "Low", or "Empty", a print media path

20 attribute having a status which is indicated as being "Clear" or "Jammed", a marking material quantity attribute, such as ink or toner, having a status which is indicated as being "Full", "Low", or "Empty", and an input/output connection attribute having a status which is indicated as being "On-Line" or "Off-Line".

As illustrated in Figure 10, electronic mail application 222, as document

25 distribution resource 232, includes attributes 622 which are monitored by respective attributes status 632. Attributes 622 of electronic mail application 222 and respective attributes status 632 of attributes 622 include, for example, a communication link attribute having a status which is indicated as being "Up" or "Down", a transfer rate attribute having a status which is indicated as being

30 "Optimal" or "Nonoptimal", as measured, for example, in bytes-per-second, and a delivery success rate attribute having a status which is indicated as being

"High", "Medium", or "Low". As such, the communication link attribute measures a connectivity or operation of electronic mail application 222 and the transfer rate attribute measures a throughput and/or speed of electronic mail application 222 as well as a number of messages sent via electronic mail

5   application 222. The delivery success rate attribute is based, for example, on a ratio of successful deliveries to delivery attempts of electronic mail application 222. Delivery failures, therefore, may be derived based on a ratio of failed deliveries to delivery attempts of electronic mail application 222. In addition, delivery retries as well as communication failures of electronic mail application

10   222 may be measured.

As illustrated in Figure 11, print service provider 223, as document distribution resource 233, includes attributes 623 which are monitored by respective attributes status 633. Attributes 623 of print service provider 223 and respective attributes status 633 of attributes 623 include, for example, a

15   consumables inventory attribute, such as print medium supply, ink or toner supply, and/or cover and binding supplies, having a status which is indicated as being "Full", "Low", or "Depleted" and a lead time attribute having a status which is indicated as being "Short" or "Long", as measured, for example, in hours or days. As such, the lead time attribute measures a turnaround time of

20   document distribution with print service provider 223. The lead time attribute is based, for example, on an availability or load as well as an operational status of equipment providing the services of print service provider 223.

In one exemplary embodiment, as illustrated in Figure 12, availability analysis system 60 includes an availability analysis module 64 and a data storage

25   system 65. Availability analysis module 64 includes hardware, software, firmware, or a combination of these. As such, availability analysis module 64 can include a computer server or other microprocessor-based system capable of performing a sequence of logic operations, including analyzing an availability of document distribution services 24. Examples of data storage system 65 include

30   non-volatile memory (e.g., a hard disk drive or other persistent storage device) and may include volatile memory (e.g., random access memory (RAM)).

Another example of data storage system 65 may include a relational database management server (RDBMS).

Data storage system 65 includes a document distribution services database 66 which stores registration of document distribution services 24, a document distribution resources database 67 which stores identification of document distribution resources 23, and a resource events database 68 which stores attributes status 63 of respective attributes 62 of document distribution resources 23. As such, availability analysis module 64 receives or retrieves input from document distribution services database 66, document distribution resources database 67, and resource events database 68 and analyzes an availability of document distribution services 24 based on attributes status 63 of respective attributes 62 of document distribution resources 23. In addition, availability analysis system 60 includes an availability history database 69 which stores availability analysis of document distribution services 24 as analyzed by availability analysis module 64.

Based on the availability of document distribution services 24 and, more specifically, document distribution resources 23, availability analysis module 64 generates one or more availability reports 70. As such, availability analysis module 64 distributes availability reports 70 to system administrator 58. In one exemplary embodiment, availability reports 70 are distributed to system administrator 58 via document distribution system controller 26 and communication network 30.

In one exemplary embodiment, availability reports 70 include real-time reports and/or historical reports of an availability of document distribution services 24 and, more specifically, document distribution resources 23. Thus, availability reports 70 may be generated based on historical analysis of the availability of document distribution services 24 as stored and retrieved from availability history database 69. Availability reports 70, therefore, identify which document distribution resources 23 and, therefore, which document distribution services 24 of document distribution system 10 are and/or have been available to users 14.

In Figure 13, a flow diagram illustrating one exemplary embodiment of a method of managing document distribution services 24 according to the present invention is illustrated generally at 200. Reference is also made to Figures 1-12. At step 210, document distribution services 24 of respective document

5   distribution providers 22 are registered with document distribution system controller 26, in a manner similar to that described above in step 110. Thus, at step 220, system administrator 58 manages document distribution services 24 of document distribution providers 22. More specifically, system administrator 58 manages document distribution services 24 at document distribution system

10   controller 26, as described above. Thus, it is not necessary for system administrator 58 to deploy, install, configure, and/or maintain document distribution services 24 of document distribution providers 22 at each computer 34.

In one exemplary embodiment, as illustrated in Figure 14, managing

15   document services 24 in step 220 includes identifying one or more document distribution resources 23 for document distribution services 24, as indicated in step 222, and monitoring an availability of document distribution resources 23 for document distribution services 24, as indicated in step 224. As such, one or more availability reports 70 for document distribution resources 23 and,

20   therefore, document distribution services 24 are generated in step 226 by availability analysis system 60 and, more specifically, availability analysis module 64 based on the availability of document distribution resources 23 as monitored in step 224. Thereafter, availability reports 70 are distributed in step 228. Availability reports 70 are distributed, for example, to system administrator

25   58 via document distribution system controller 26 and communication network 30, as illustrated in Figure 8.

Preferably, identifying document distribution resources 23 for document distribution services 24 in step 222 includes defining attributes 62 of respective document distribution resources 23. As such, monitoring availability of

30   document distribution resources 23 for document distribution services 24 in step 224 includes recording attributes status 63 of attributes 62, as described above.

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In addition, generating availability reports 70 for document distribution resources 23 in step 226 includes compiling or analyzing attributes status 63 of attributes 62 for respective document distribution resources 23.

In one exemplary embodiment, steps 110-122 of method 100 and/or steps

5   210 and 220 of method 200, including steps 222-228, are performed via computer-executable instructions of a computer-readable medium. Computer-readable medium, as used herein, is defined to include any kind of computer memory such as a floppy disk, conventional hard disk, CD-ROM, Flash ROM, nonvolatile ROM, RAM, etc.

10   By having document distribution services 24 of document distribution providers 22 registered with document distribution system controller 26, document distribution system 10 provides a consolidated system for accessing as well as managing document distribution services 24. More specifically, document distribution system 10 presents user 14 with a plurality of document

15   distribution services 24 and, therefore, a plurality of distribution options 32 for document 12. As such, user 14 can specify one or more distribution options 32 for document 12 by accessing one system. Document 12, therefore, can be simultaneously distributed with multiple services. Thus, it is not necessary for user 14 to access multiple systems to distribute document 12.

20   In addition, by having document distribution services 24 of document distribution providers 22 registered with document distribution system controller 26, system administrator 58 can manage document distribution services 24 centrally at document distribution system controller 26 rather than individually at each computer 34. Thus, management of document distribution services 24,

25   including, for example, deployment, installation, configuration, and/or maintenance, is simplified.

Furthermore, by providing document distribution system 10 with availability analysis system 60, an availability of document distribution services 24 can be monitored and availability reports 70 of such availability can be

30   generated. As such, which document distribution services 24 are working and/or available, including, for example, how long and/or how well document

distribution services 24 have been working and/or available can reported. Thus, system administrator 58, for example, can review real-time as well as historical analysis of the availability of document distribution services 24, including the availability of document distribution resources 23 providing document

5   distribution services 24. Accordingly, proactive measures can be taken to ensure the availability of document distribution services 24 to users 14.

Although specific embodiments have been illustrated and described herein for purposes of description of the preferred embodiment, it will be appreciated by those of ordinary skill in the art that a wide variety of alternate

10   and/or equivalent implementations may be substituted for the specific embodiments shown and described without departing from the scope of the present invention. Those with skill in the chemical, mechanical, electro-mechanical, electrical, and computer arts will readily appreciate that the present invention may be implemented in a very wide variety of embodiments. This

15   application is intended to cover any adaptations or variations of the preferred embodiments discussed herein. Therefore, it is manifestly intended that this invention be limited only by the claims and the equivalents thereof.